

ABSTRACT

A machine structural steel product having superior formability of rotary-forming, torsional properties, and quenching-crack resistance is provided which is manufactured using an electric furnace instead of a blast furnace and which removes adverse influences of tramp elements. A drive shaft having a superior static strength and fatigue strength is provided. In particular, the machine structural steel product contains: on a mass percent basis, C: 0.35% to 0.50%; Si: 0.15% or less; Mn: 0.20% to 1.1%; P: 0.02% or less; S: 0.005% to 0.035%; Cr: more than 0.1% to 0.2%; Mo: 0.05% to 0.5%; Ti: 0.01% to 0.05%; Al: 0.01% to 0.05%; N: 0.01% or less; B: 0.0005% to 0.0050%; Cu: 0.06% to 0.25%; and Ni: 0.05% to 0.2%, and in addition, the composition described above is adjusted so that an LD value represented by the following equation (1) satisfies 120 or less.

$$\begin{aligned} \text{LD} = & 0.569 \times \{7.98 \times (C)\}^{1/2} \times (1+4.1\text{Mn}) \cdot (1+2.83\text{P}) \cdot (1-0.62\text{S}) \cdot \\ & (1+0.64\text{Si}) \cdot (1+2.33\text{Cr}) \cdot (1+0.52\text{Ni}) \cdot (1+3.14\text{Mo}) \cdot (1+0.27\text{Cu}) \cdot \\ & (1+1.5(0.9-C)) \} + 52.6 \quad \dots \quad (1) \end{aligned}$$

In the above equation, C, Mn, P, S, Si, Cr, Ni, Mo, and Cu in the equation each indicate the content (mass percent) of the respective elements.